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TURNTABLE APPARATUS
[Tanteburu sochi]

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TITLE (54): TURNTABLE APPARATUS

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Claims

1. A turntable apparatus installed in the main body of an audio device and accommodating a cartridge wherein disc-shaped recording media or the like are loaded, characterized by the following facts:

N turntables are disposed in a concentric manner on a tray that is retractable with respect to the main body of said audio device;

the direction of said cartridge as it is mounted on said turntables when the tray is open is the same as the direction of said cartridge when it is conveyed to the recording/play unit by the movement of said turntables.

2. The turntable apparatus described in Claim 1 characterized by the following facts: a fixed gear with a prescribed number of teeth is fixed on said tray, and a rotary plate is installed in a freely rotatable manner coaxially with the fixed gear;

a rotary gear with a prescribed number of teeth and engaged with said fixed gear is disposed on said turntable; and

said turntable rotates as said rotary plate rotates.

3. The turntable apparatus described in Claim 1 characterized by the fact that said N is 3 or 5.

Detailed explanation of the invention

[0001]

Technical field of the invention

The present invention pertains to a turntable apparatus suitable for an audio device. More specifically, plural turntables are disposed in a concentric manner on a retractable tray. The mounting direction of the cartridge mounted on the turntables is the same as the mounting direction when the

cartridge is conveyed to the position of the recording/play unit by the movement of the turntables. Recording/playback is performed in the cartridge.

[0002]

Prior art

An audio device using an MD (Mini Disc) cartridge as the recording medium is widely known. In this audio device, for example, plural MD cartridges are accommodated in the main body of the audio device. If the selected disc can be recorded/played back, continuous playback or the like can also be realized. This is convenient. For example, a turntable that can carry plural MD cartridges as shown in Figure 5 can be used as the aforementioned apparatus.

[0003]

In the example shown in the figure, a nearly triangular turntable 2 is installed in a freely rotatable manner around its central part 5 on tray 8 that is retractable with respect to the main body of audio device 1. Rectangular mounting parts 4a, 4b, 4c that are slightly bigger than MD cartridge 3 are formed concavely at three places on turntable 2 in this example. As shown in Figure 5, tray 8 can advance as far as about half its depth. Consequently, in this example, the user can load MD cartridge 3 at two places, that is, mounting parts 4b, 4c positioned in the front of turntable 2.

[0004]

MD cartridge 3 mounted on turntable 2 is conveyed by the rotation of turntable 2 and moves to the position of recording/playback unit 6 disposed in the main body of audio device 1. The MD cartridge 3

disposed this way enters a recordable/playable state as shutter 7 is made to slide by a mechanism not shown in the figure.

[0005]

Since recording/playback unit 6 is installed at a prescribed position in the main body of audio device 1, not only the up/down direction but also the front/back direction (left/right direction) of MD cartridge 3 rotated to said recording/playback unit 6 should point to prescribed directions. In other words, in Figure 5, when MD cartridge 3 on the left side is mounted such that shutter 7 points upper left and the MD cartridge 3 on the right side is mounted such that shutter 7 points to lower left, as MD cartridge 3 is conveyed to the position of recording/playback unit 6, shutter 7 reaches the right horizontal position.

[0006]

The recording/playback operation of MD cartridge 3 can be carried out smoothly by properly mounting MD cartridge 3 at each of mounting parts 4a, 4b, 4c.

[0007]

Problem to be solved by the invention

For turntable 2 shown in Figure 5, however, in order to arrange MD cartridge 3 in correct direction at the position of recording/playback unit 6, the shutter 7 of MD cartridge 3 is mounted to face upper left with respect to mounting part 4c, and the shutter 7 of MD cartridge 3 is mounted to face lower left with respect to mounting part 4b. Since said direction is opposite to the arrow direction displayed on the MD cartridge to indicate the MD insertion direction, the user may load the cartridge in the wrong direction.

If the cartridge is loaded in the wrong direction, it is not possible to carry out the recording/playback operation.

[0008]

When the user loads MD cartridge 3, it is not easy to tell which direction the shutter 7 of MD cartridge 3 should face. This will cause a problem when using the device.

[0009]

The objective of the present invention is to solve the aforementioned problem by providing a turntable apparatus that can unify the mounting directions of the cartridges on the turntable.

[0010]

Means to solve the problem

In order to realize the aforementioned objective, the present invention provides a turntable apparatus installed in the main body of an audio device and accommodating a cartridge wherein disc-shaped recording media or the like are loaded. The turntable apparatus is characterized by the following facts: N turntables are disposed in a concentric manner on a tray that is retractable with respect to the main body of said audio device; the direction of said cartridge as it is mounted on said turntables when the tray is open is the same as the direction of said cartridge when it is conveyed to the recording/play unit by the movement of said turntables.

[0011]

According to the present invention, plural turntables are disposed concentrically on a retractable tray. The mounting direction of the cartridge when it is mounted on the turntable is made the same as the mounting direction when the cartridge is conveyed to the position of the recording/playback part by the movement of the turntable. When the mounting directions of the cartridge are unified this way, it is possible to prevent the cartridge from being mounted in the wrong direction with respect to the turntable.

[0012]

Embodiment of the invention

In the following, an embodiment of the turntable apparatus disclosed in the present invention will be explained in detail with reference to figures.

[0013]

Figure 1 shows the configuration of audio device 1 using turntable apparatus 30 disclosed in the present invention. For the purpose of explanation, in this figure, the gear parts of rotary gear 35 and fixed gear 37 to be described later are shown by solid lines.

[0014]

Said turntable apparatus 30 is installed in a retractable manner with respect to audio device 1. In this example, it can stick out by as much as half of the tray. In this case, up to three MD (Mini Disc) cartridges 3 are accommodated, and MD cartridge 3 selected from them can be recorded/played.

Therefore, tray 8 is installed in a retractable manner with respect to audio device 1, and three turntables 31 are installed concentrically on the tray.

[0015]

Figure 2 shows the case when viewing audio device 1 equipped with said turntable apparatus 30 from the front. As shown in this figure, audio device 1 has an operation unit 22 used for controlling cassette accommodating part 21 wherein set tape is accommodated and controlling various kinds of operations. Turntable apparatus 30 is disposed below the operation unit.

[0016]

In Figure 2, turntable apparatus 30 is comprised of turntable 31 whereon MD cartridge 3 is mounted, rotary plate 32, and tray 8. Turntable 31 has a rotary gear 35 with a prescribed number of teeth (for example, 20) formed integrally under the disc-shaped member where mounting part 34 used for mounting the cartridge is formed concavely. Shaft 36 is inserted through the center of said turntable 31 and is installed in a freely rotatable manner on rotary plate 32.

[0017]

On the other hand, fixed gear 37 with a prescribed number of teeth (in this example, 40) is fixed at the center of tray 8. When rotary plate 32 is installed in a freely rotatable manner on tray 8 to be coaxial with said fixed gear 37, fixed gear 37 is engaged with rotary gears 35. The rotation force of rotary plate 32 is provided by a driving means not shown in the figure.

[0018]

In turntable apparatus 30 with the aforementioned configuration, mounted MD cartridge 3 is conveyed by rotation of rotary plate 32. In Figure 3, for example, when rotary plate 32 rotates by 1/3 turn counterclockwise, first, rotary gear 35 rolls on fixed gear 37 while rotating counterclockwise.

[0019]

In other words, turntable 31 rotates counterclockwise around fixed gear 37 while rotating by itself as shown in Figure 3. When rotary plate 32 further rotates, the state shown in Figure 1 is resumed. The conveyed MD cartridge 3 is allocated to the position of recording/playback unit 6 and faces the same direction as that when it is mounted.

[0020]

The direction of turntable 31 after 1/3 turn is fixed because the number of teeth of rotary gear 35 is set to 20 and the number of teeth of fixed gear 37 is set to 40 and the number of turntables 31 is three as described above. In other words, in this case, rotary plate 32 interacts to rotate by 1/3 turn counterclockwise with respect to tray 8, and rotary gear 35 rotates by 2/3 turn counterclockwise with respect to rotary plate 32.

[0021]

This relationship is expressed by $n1/n2 = N-1$, wherein n1 is the number of teeth of fixed gear 37, n2 is the number of teeth of rotary gear 35, and N is the number of MD cartridges 3 that can be mounted. If said equation is satisfied, MD cartridge 3 rotated to recording/playback unit 6 faces the same direction as that when it is mounted. In this example, since $n1=40$, $n2=20$, and $N=3$, said equation is satisfied.

[0022]

Since the direction that the two turntables 31 in the front face is the same as the direction that the turntable 31 positioned at recording/playback unit 6 disposed deep in audio device faces, the mounting positions of the cartridges can be unified. In particular, when plural MD cartridges 3 are mounted on the front side, if the mounting directions are unified, the user will not feel unpleasant when mounting MD cartridges 3 and can mount MD cartridge 3 by pointing it as indicated by the arrow direction shown on MD cartridge 3. Therefore MD cartridge 3 will not be mounted in the wrong direction.

[0023]

If said equation (n1/n2 = N-1) is satisfied, as shown in Figure 4, for example, even if there are five turntables 31, the direction that the two turntables 31 in the front face is the same as the direction that the turntable 31 positioned at recording/playback unit 6 disposed deep in audio device 1 faces, and the mounting directions of the cartridges can be unified.

[0024]

In this example, the case of using three and five MD cartridges 3 has been explained. The present invention, however, is not limited to this. As long as n1/n2 = N-1 is satisfied, the number of MD cartridges 3 that can be mounted can be set differently.

[0025]

Effects of the invention

As explained above, in the turntable apparatus disclosed in the present invention, the turntables are installed in freely rotatable manner on a rotary plate installed in freely rotatable manner on a tray. The rotary gears of the turntables are engaged with the fixed gear fixed on the tray coaxially with the rotary plate. The number of teeth of said fixed gear and rotary gear are set to prescribed numbers, respectively. The front/back direction of the cartridge when it is mounted on the turntable is set to be the same as the front/back direction when said cartridge is rotated and moved to the position of the recording/playback unit by the rotary plate.

[0026]

Consequently, since the mounting directions of the cartridges can be unified, the user will not feel unpleasant when mounting the cartridges on the turntables, and the cartridges will not be mounted in the wrong direction.

Brief description of the figures

Figure 1 is a diagram illustrating the configuration of the audio device using the turntable apparatus disclosed in the present invention.

Figure 2 is the top view of the turntable apparatus.

Figure 3 is a top view illustrating the state when turntable 2 is rotating.

Figure 4 is a diagram illustrating the case when five turntables are installed.

Figure 5 is a diagram illustrating the configuration of a conventional example.

Explanation of symbols

1	Audio device
2	Turntable
3	MD cartridge
4a, 4b, 4c, 34	Mounting parts
6	Recording/playback unit
8	Tray
30	Turntable apparatus
31	Turntable
32	Rotary plate
35	Rotary gear
37	Fixed gear

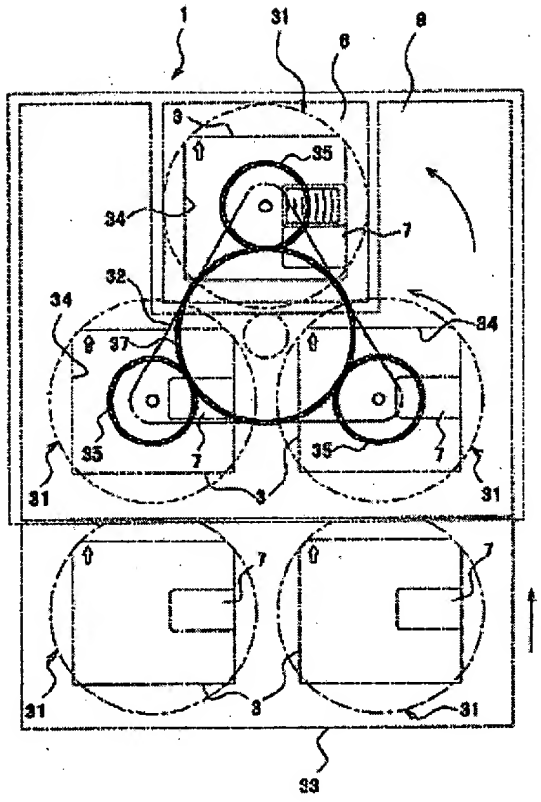

Figure 1. Top view of turntable apparatus 30

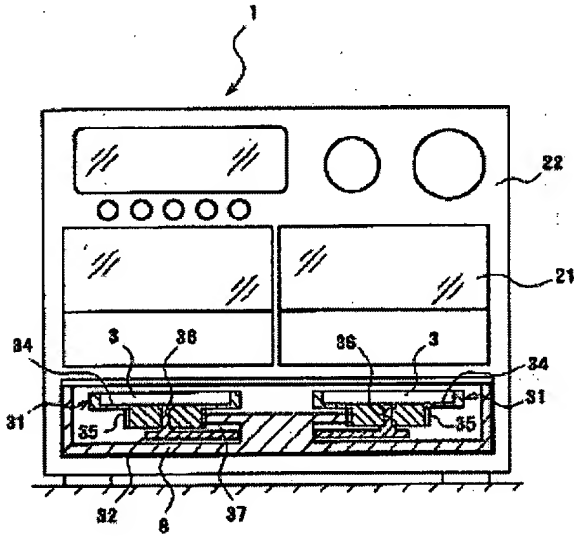

Figure 2. Cross-sectional view of the main parts of audio device 1 using turntable apparatus 30 disclosed in the present invention.

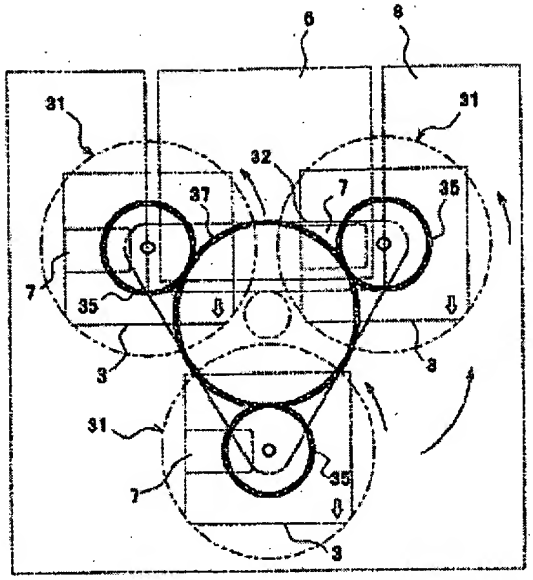

Figure 3. Top view of turntable apparatus 30

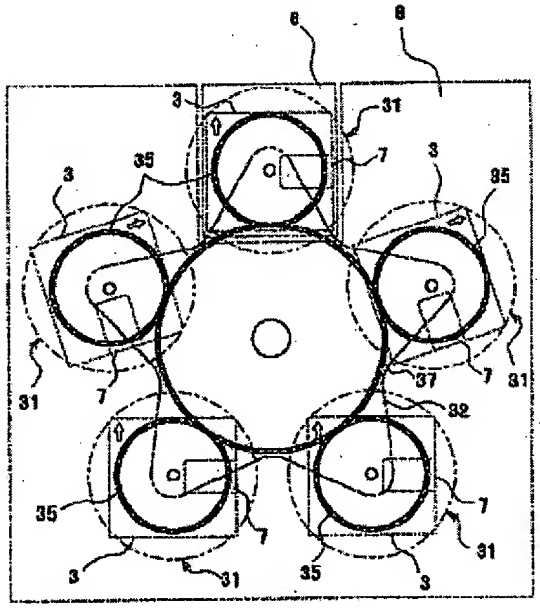

Figure 4. When five mounting members 31 are used

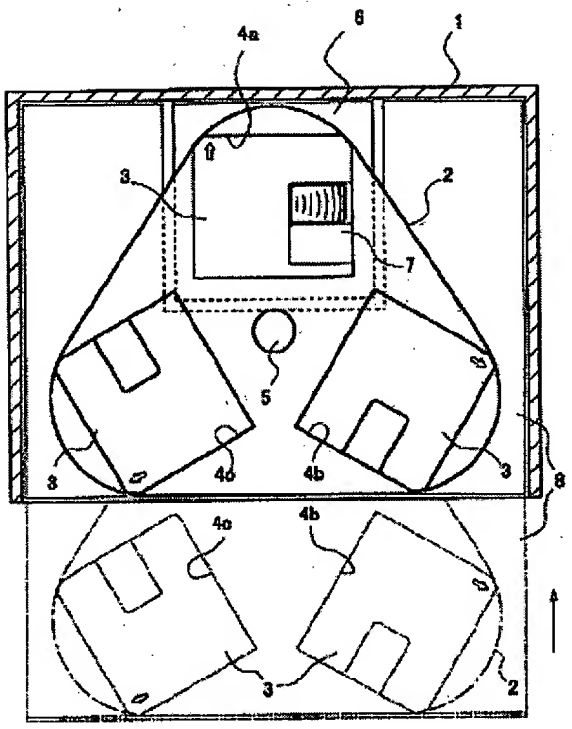

Figure 5. Configuration of the conventional example